

AGRICULTURAL CONTRACTS: DATA AND RESEARCH NEEDS

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Though the use of contracts in the U.S. agriculture is not a new phenomenon, there is new interest in both the extent and consequences of their use. Some useful data regarding the extent of contracts in agriculture, which we review briefly below, do exist, but the more interesting questions for social scientists and policymakers have to do with the effects of the use or adoption of contracts on outcomes. Unfortunately, data tend to fail us when we attempt to address questions regarding the effects of contracts. Any changes induced by contracts necessarily depend on the specific provisions of actual contracts, and these can be difficult to summarize in a useful way. The actions and states of the world governed by contracts can be complicated and vary widely across environments.

This problem was recognized long ago by Mighell and Jones (1963), who sought to systematically organize contracts into different types, and who drew a distinction between “production” and “marketing” contracts that still guides some contemporary efforts to collect data on agricultural contracts. We argue that this distinction is of very little value for understanding the range of contemporary agricultural contracts. Not only does this typology obscure important differences in contracts by offering only two possible types, but (worse) contracts used by producers often do not clearly govern production or marketing singly, but rather touch upon aspects of both. In this article, we discuss possibilities for systematic data collection that we believe can aid in building further general knowledge regarding

agricultural contracts, and that can support more specific research projects as need or interest arises.

The Extent of Agricultural Contracts

In research that was well ahead of its time, Mighell and Jones (1963) estimated that in 1960 U.S. farmers delivered about 19% of all crop production and 27% of all livestock production under some form of “production” contract. Moreover, they noted that for some commodities (e.g., processing vegetables and sugar beets), contracts have “long been significant” (Mighell and Jones 1963, p. 64). At the time the authors were reporting, there were no official statistics on the extent of contracting in agriculture, so the data were “based on the best judgments of a number of production and marketing specialists in the Department (USDA 2006).” More recently, MacDonald et al. (2004) use data from the U.S. Department of Agriculture’s 2001 Agricultural Resource Management Survey (USDA ARMS) to report that some form of contract was used in the delivery of roughly 26.2% of the value of all crop production and 46.8% of the value of all livestock production (USDA 2006). Although these two sets of numbers are not directly comparable,¹ there does not appear to have been a large aggregate increase in the extent of crop contracting during the last forty years, though contracting in markets for livestock has nearly doubled. In more recent times, and using more comparable data, the MacDonald et al. (2004) report documents a modest 6% point increase between 1978 and 2001 in the share of all farm commodities delivered under a production contract.²

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¹ The series are different because one is based on quantity and the other on value, and because the definition of what defines a “contract” is different across the studies. Mighell et al. (1963) focus exclusively on production contracts, while MacDonald et al. (2004) report on both production and marketing contracts.

² Additionally, there has been little or no increase (possibly even a decrease) in the extent of “vertical integration,” or of food

The research conducted by Mighell and Jones (1963) appears to have been a response to the dramatic transformation of the poultry sector during the 1950s from market-to contract-based procurement. Their report ends with a call to arms and a summary of research needs that at the time included studies of “measurement and description; performance and effects; social attitudes and educational methods; methods of improving vertical coordination; and supply management and vertical coordination.” A number of researchers responded to this call. Cambell (1973) provides a bibliography on the topic as of the early 1970s that documents various efforts to describe and measure the extent and nature of contracting. However, the research appears not to have attracted much interest from academic journals at that time, and eventually research on the topic seems to have died down through the late 1970s and 1980s. This changed in the 1990s as advances in information and contract economics entered the mainstream, and agricultural economists were handed the tools needed to formalize hypotheses about the structure and performance of contracts. The papers by Knoeber and Thurman (1994, 1995) are among the earliest in this more recent literature (which we briefly synthesize below) on agricultural contracting.

Methodological tools continue to develop (see Bolton and Dewatripont 2005), but interest in the study of agricultural contracting is now motivated to a greater degree by what is happening in industry. Although the aggregate incidence of contracting has increased only modestly, farm-to-market contracting is implicated in a wide variety of current policy issues: The pork industry experienced a transformation during the 1980s and 1990s not unlike what happened in poultry during the 1950s; contracts between beef packers and feed lots are believed by some to offer opportunities for strategic anti-competitive manipulation of spot markets for live cattle; McDonald's and Burger King, among others, have demanded delivery of processed meat raised on the farm and brought to slaughter according to specific animal-welfare guidelines; and heightened concern about the environmental consequences of farming in poultry and pork production raise issues regarding the

assignment of liability across contractor and contracted.

Informed debate, and ultimately policy guidance, with respect to these and other issues requires an understanding of the forces that shape contract design. Although there have been a number of recent research efforts, most have been theoretical or based on a proprietary data source that does not permit access by other researchers. Perhaps this is not surprising given the proprietary nature of most forms of contracting. In the end, the best we can do may be to exploit what access we *do* have to proprietary data to the fullest possible extent. Nevertheless, we believe that there is potentially an opportunity for, and value in, collecting publicly accessible data.

Empirical Approaches for Studying Contract Relationships

Space limitations preclude a complete literature review. In this section, we identify three types of empirical work that have been carried out, and briefly review select examples of each that are most familiar to us. For a detailed bibliography, see Dimitri et al. (2007).

Some authors have examined a single or small number of individual contracts (e.g., Hueth and Ligon 1999; Hueth and Melkonyan 2004). Viewing a contract as a “data point,” empirical studies of this sort are based on a rather small number of observations. However, this criticism ignores the differential information content of a contract relative to, say, a single consumption or production decision. Contracts are negotiated by two or more parties so that an equilibrium contract depends on the preferences of more than a single agent. Second, based on the presumption that contracts are designed optimally, a single contract contains information not only about preferences, but also about the structure of production in the relevant environment. A contract maps production outcomes into compensation, which effectively means that compensation must be specified for all (or nearly all) possible production outcomes. Using the now familiar “first-order approach” for designing an efficient contract in an environment with moral hazard, this mapping is characterized by a relationship between marginal utilities (representing preferences), a likelihood ratio (reflecting production structure), and a pair of Lagrangian multipliers, one of which reflects the nature of the agent's outside

processing firms participating directly in farm production. Mighell and Jones (1963) report that 3.9% of farm production occurred in such firms in 1960, while MacDonald et al. (2004) report a reduction in this number from 3.0 to 1.9% between 1978 and 2002.

options. If this approach is a reasonable way of modeling actual contracts, then observed contracts implicitly contain information about each of these objects. Empirically, the central challenge is identification. Contract structures within a given contract environment tend not to vary greatly. Absent frequent exogenous shocks of sufficient magnitude to induce changes to observed equilibrium contracts, it is generally not possible to disentangle preference and production structures from observation of a single contract.

Obtaining a rough description or the entire written version of one or a small number of contracts is generally feasible where there is interest in doing so. However, much can be gained by observation of contractual *outcomes* across time and space. For example, observing production levels and payments under a given contract repeatedly over time may allow for inference with respect to contractual dynamics. Contractual outcomes may be determined in part by implicit understandings held by the parties, or by unobserved renegotiation. To the extent that observed outcomes differ from what is prescribed in the written contract, it may be possible to infer something about the nature of implicit contracting and commitment. Alternatively, observing outcomes across multiple producing agents in a given time period may allow for inference with respect to the production structure with which agents operate. Research of this nature has accounted for the largest quantity of published research on agricultural contracts (e.g., Knoeber and Thurman 1994; Levy and Vukina 2004; Hueth and Ligon 2002).

Cross-sectional observation of discrete contract characteristics represents a third form of data. For example, one might have a set of hypotheses regarding how a particular contractual provision or attribute should vary across different contracting environments, and then set about testing each hypothesis by collecting data on variation of the relevant characteristic in a cross section together with exogenous conditioning variables. This approach has been commonly employed in the empirical literature on franchise contracting. One might start with some hypothesis regarding how royalty rates should be high or low, depending on the degree of moral hazard present, and then relate observable variation in characteristics of the firms studied to differences in the degree of moral hazard. The benefit of this empirical approach is being able to collect enough contract data to perform statistical inference. However,

surprisingly few researchers have used this approach to study agricultural contracts (see Goodhue et al. 2003 for an exception).

Future Data Collection Possibilities

Should there be a collective effort among agricultural economists to support systematic data collection on agricultural contracting, and, if so, what form should this effort take? Our view is that collecting contracts by itself is unlikely to lead to a useful research resource. Collecting individual contracts without knowing something about the relevant contracting parties and relevant economic environment leaves one with little information to explain or answer questions about any given contract. Collecting data on contractual outcomes is not likely feasible across an entire industrial sector. Absent collection of individual contracts or of outcomes under specific contract relationships, the only remaining option of the three discussed in the previous section is collection of information on contract characteristics from a cross section of commodities. We believe that some version of this approach is both feasible and potentially useful. There are a number of ways to go about collecting and making accessible such data, but the task will inevitably be somewhat different than what is done with regard to other sorts of data.

First, contracts are high-dimensional objects, and the relevant dimensions vary across commodities. Unlike collection and dissemination of prices and quantities, some tailoring with regard to the specific data elements that are reported for each commodity will be required. Second, many of the terms and conditions that are used in contracts have special meaning to the given sector. Thus, collecting data will require effort to identify the relevant contracting terms and provisions, and then to focus a data collection and reporting effort based on some subset of these. Ultimately, some judgment will be needed to evaluate the right balance between simply "reporting the contracts" and reporting summary information about the contracts. For a given sector, reporting might involve definition of the relevant set of contracting terms and provisions, a few example contracts, and summary information about the use and relative incidence of different kinds of contracts. Third, evidence to date suggests that contracts evolve either very slowly over time or in large discrete jumps. Thus, much of the data that is collected will

be static with very little change from year to year. Whatever data is collected, there will always be need for additional data to answer specific questions. The need, then, is for data that is potentially a good starting point for many questions.

We can think of two kinds of “data” that can serve this purpose. The first are case-study descriptions that document “typical” contracts and that describe the organizational and institutional setting for the relevant commodity sector. The second are survey data that document variation of contract characteristics across individuals and firms within the sector. At present, there are a few scattered sectoral studies that summarize generic contracting issues within particular sectors, but none that systematically document and describe specific contracts and contracting practices. The USDA ARMS (USDA 2006) survey includes questions on contracting that were designed to help track flows of revenues and expenses among farm businesses, landlords, contractors, and other service providers.³ The survey distinguishes two contract types, “marketing” and “production” contracts, in an attempt to account for situations where contractors pay for a significant portion of farm expenses.

Guidance for making the distinction is provided by offering parenthetical definitions of each type of contract: “A *production contract* is a verbal or written agreement setting terms, conditions, and fees to be paid by the contractor to the operation for the production of crops, livestock, or poultry. The contractor usually owns the commodity and often provides inputs; A *marketing contract* is a verbal or written agreement setting a price and market before harvest for a crop or before removal from the operation for livestock or poultry. The operation usually owns the commodity prior to delivery, and provides most or all inputs.”⁴ Two key distinctions are made here: (1) a production contract pays “fees,” while a marketing contract sets a price and market before harvest or

animal removal, and (2) under a production contract, the contractor *usually* owns the commodity and *often* provides the inputs, while the reverse is *usually* the case in a marketing contract. It is easy to imagine respondents having difficulty parsing these definitions. What is the difference between a “fee” and a “price,” and how should the “usually” and “often” qualifiers be interpreted?

There do seem to be two qualitatively distinctive motivations for contracting. Some contracts are used to coordinate delivery of specific quantities and qualities of agricultural goods while others are offered as a marketing service to farmers. A tomato processor or poultry integrator operates a manufacturing plant where there is a need to plan the flow of farm deliveries. Some form of *ex ante* contract is a natural response to the need for this kind of planning. In contrast, dairy processors or grain handlers act as intermediaries between farmers and futures markets by offering forward price contracts. Their “plants” are more flexible and allow for storage and diversion of goods to neighbor facilities if necessary. Contracts do indeed look different across these two sets of environments. The trouble, however, is that there are many intermediate cases where the distinction becomes blurred. An example: A fresh-fruit packer intermediates between a handful of growers and downstream retail markets. The grower-packer relationships are informal (no written contract), but there is significant planning regarding deliveries as harvest time approaches. The packer has field representatives who communicate regularly with each grower and who may have some influence over growers’ cultivation and varietal choices. Should a single bilateral grower-packer relationship in this setting be classified as a production or a marketing contract?

Some amount of further data collection will inevitably take place in response to specific policy needs and the curiosity of researchers. There is value, however, in systematically collecting publicly accessible data that summarizes the incidence and nature of agricultural contracting. We do not think that the distinction between “production” and “marketing” contracts serves this purpose well. The meaning of the distinction varies across commodity sectors, and creates confusion when discussing agricultural contracts in general. Moreover, it seems unlikely that any sort of classification scheme will adequately capture variation in the characteristics that are relevant for research and policy uses. Instead, we need better

³ The primary goal of ARMS, which is to develop farm business, farm sector, and farm household financial data, drives the design of the sample design (a broad-based and heterogeneous set of farms) and the form of the questions. Specifically, the changes in livestock and poultry industries noted above—in which most expenses were borne by non-farm integrators who provided inputs to contract growers, and who then removed the mature chickens or hogs from the farm for sale or processing—created challenges for estimating sectoral expense and revenue flows.

⁴ Section E, Farm Income, 2005 USDA ARMS “core” mail survey. Complete documentation can be found at <http://www.ers.usda.gov/Data/ARMS/>. More detailed cost-and-return and commodity-specific enumerated surveys are also administered where enumerators are trained to help respondents distinguish between production and marketing contracts.

information on the specific characteristics that contracts have and how these characteristics vary across time, space, and across individual contracting parties. Collecting information on just one or a small number of characteristics (e.g., ownership or provision of inputs, provision of finance, contract duration, and formality) across a large number of commodity sectors would generate vastly greater information than what is currently available.⁵

Evidence from California and Future Research Needs

Hueth and Ligon (1999) report on results from a pilot survey of contractors in California fruit and vegetable markets. Results from the full survey suggest that it is not uncommon for contracting firms to also engage in farm-level production. Nearly half of all 385 responding firms grow produce in-house with firms reporting on average that 18% of farm inputs are obtained this way. Of the produce that is purchased from external growers, more than half was typically obtained via an informal relationship. It is not uncommon for firms to be highly involved in farm-level decision making, to provide inputs directly, to provide finance, or to exercise some control over harvest timing. Many firms specialize contracts to individual growers, and firms typically have long-term relationships (at least five years) with over half their growers. The survey and data are available for public use. For access instructions, see Hueth and Ligon (2007).

These observations suggest a number of potentially interesting research questions. For example:

1. The “make or buy” decision has probably received more attention than any other within the literature on contracting and firm boundaries. In agricultural markets, firms often are hybrid organizations that make *and* buy. What purpose does this hybrid form serve?
2. Why are so few contracts formalized, and are more formal arrangements superior? Presumably, lawyers and other sources

of “advice” for farmers might suggest that using a written contract is advisable. Is it?

3. Although the farm is often treated as an autonomous decision-making unit, first-level handlers are clearly involved to some extent in the decisions that farmers make. What purpose does this involvement serve? Monitoring, exercise of authority, and provision of information are all candidates.
4. How does one measure market power or price discrimination in a contractual relationship? Variation in contract terms across individual growers seems necessary but not sufficient.
5. Contracts are often used to securitize debt in financing new farm-level capital. What is the economic rationale for tying marketing and lending activities?

Study of these questions and finding research-based answers requires original thinking and specialized data collection. Incentives are in place for individual researchers to undertake efforts aimed at answering these questions. Data approaches likely will involve some combination of surveys (of growers, firms, lenders, and of the lawyers who serve contracting parties) and of case-study type research, which yields detailed information about specific contractual relationships. There are also a number of regional research groups among members of Land Grant universities where study of contracts and organizations might reasonably have a place, though perhaps there is need for a separate organization to encourage stronger links among interested university and government researchers. Whatever efforts emerge, all would benefit from better descriptive data on the form that contracts take, and how form varies within and across sectors.

Conclusions

Data on the incidence and structure of agricultural contracts are scarce. No doubt this is because contracts govern business relationships, and the information they contain sometimes has strategic value. Contracts are difficult to “measure” even with full cooperation of contracting parties. The written content of contracts can be complex and, to the extent that there are implicit elements of a “contract,” may only partially describe the rights and obligations of the relevant parties. Of the

⁵ The USDA ARMS cost-and-return and commodity-specific enumerated surveys ask a number of questions regarding contract attributes (USDA 2006). Within the context of the commodities this survey covers, this is potentially useful data. Unlike the data reported below, however, it is *contractees* rather than *contractors*, who are sampled. Either respondent is potentially relevant, depending on the question one is trying to answer. In some cases, it may even be necessary to collect information from both populations.

empirical research that has been conducted to date, most has relied on idiosyncratic success that individual researchers have had in negotiating access to the private business of firms. In some cases, this has been access to individual contracts, while in other cases access has included contracts plus compensation and production outcomes. Some researchers have surveyed either farmers or firms to obtain cross-sectional evidence on variation in contract characteristics. Data of this sort only crudely summarizes contracts, but is useful because it allows greater coverage of the research population. Finally, USDA ARMS and agricultural census data report on the incidence of "marketing" and "production" contracts.

Although collecting data from individual firms or surveying contracting parties is a difficult task, there is no viable alternative for learning about the nature and importance of contracting in agriculture. We have questioned the value of the production/marketing contract typology that the USDA uses. Rather than ask grower-respondents to classify their contractual relationship into one of two categories, it would be more informative to ask a few specific questions about the contracts they use. We suggest that there may also be value in gradual accumulation of sectoral "clearinghouses," where the organizational structure of commodity sectors—including the nature and incidence of alternative contracting practices—is described and summarized. Summary information of responses to questions about specific contract characteristics, together with sectoral descriptions of how production and marketing are organized, would provide general information that individual researchers (or research groups) can use to launch investigations on more specific topics as the need or interest arises.

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